

## **ACTIVATING HEADREST**

### **CROSS-REFERENCE TO RELATED APPLICATIONS**

[001] This application claims priority of Korean Application No. 10-2003-0035590, filed on June 3, 2003, the disclosure of which is incorporated fully herein by reference.

### **FIELD OF THE INVENTION**

[002] Generally, the present invention relates to a vehicle seat headrest. More particularly, the headrest is automatically activated upon a rear collision to minimize whiplash injury to the neck of an occupant.

### **BACKGROUND OF THE INVENTION**

[003] Typically, during vehicle collisions from behind, the occupant's head is thrust backward with such inertia that the neck becomes strained. Many neck injuries occur from this motion.

[004] Accordingly, a safety device designed to minimize injury to the occupant's neck during a rear collision would be advantageous.

### **SUMMARY OF THE INVENTION**

[005] According to an embodiment of the present invention an activating headrest is adapted to effectively limit movement of an occupant's chest and head in relation to their neck in the event of a rear collision, thereby improving the safety of a vehicle.

[006] In another embodiment, an activating headrest comprises a headrest and a detecting link integrally linked to the headrest. The headrest is pivotally mounted to a seat frame so that the detecting link shifts when it is pressed by an occupant's back as a result of a rear impact. A return spring is installed between the detecting link and the seat frame. A stopper means is installed between the seat frame and the detecting

link and fixes the headrest in an upward and forward position to prevent the occupants head from being thrust backward.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[007] For a better understanding of the nature and objects of the present invention, reference should be made to the following detailed description, read in conjunction with the accompanying drawings, in which:

[008] FIG. 1 illustrates a frontal view of an activating headrest of a vehicle seat according to an embodiment of the present invention;

[009] FIG. 2 is a rear view of the seat of FIG. 1;

[0010] FIG. 3 is a detailed view of a return spring installed between a detecting link and a seat frame according to an embodiment of the present invention;

[0011] FIG. 4 illustrates a detecting plate installed at a detecting rod of the detecting link according to an embodiment of the present invention;

[0012] FIG. 5 illustrates an initial state of a stopper means illustrated in FIG. 1;

[0013] FIG. 6 illustrates an operational state of the stopper means during a shift of a headrest supporting pipe according to an embodiment of the present invention;

[0014] FIG. 7 illustrates the stopper means after the headrest supporting pipe finishes shifting according to an embodiment of the present invention;

[0015] FIG. 8 is a side view illustrating a headrest and a detecting link in an initial state according to an embodiment of the present invention; and

[0016] FIG. 9 is a side view illustrating the shifted state of the headrest and the detecting link during a rear crash according to an embodiment of the present invention.

### **DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

[0017] A detecting link 3 is integrally linked to a headrest 1 and pivotally mounted to a seat frame 5. The detecting link 3 shifts when it is pressed by an

occupant's back, for example during to a rear impact. The detecting link 3, shown in greater detail in FIG. 3, is resiliently supported and fixed to the seat frame 5 via a return spring 7. A stopper means 50, FIG. 1, is placed between the seat frame 5 and the detecting link 3 for fixing tilted headrest 1 in an upward and forward position to prevent the head of an occupant from being thrust backward.

[0018] The detecting link 3 comprises a headrest supporting pipe 11 into which a headrest rod 9, which protrudes out at the bottom of the headrest 1, is inserted. A horizontal rod 13 is fixed to the bottom end of the headrest supporting pipe 11, and a pivot arm 15 is installed at both ends of the horizontal rod 13. A detecting rod 17 protrudes toward the bottom of the horizontal rod 13, and a detecting plate 19 is installed at the detecting rod 17.

[0019] The pivot arm 15 is secured via a hinge to a supporting bracket 21, which is integrally fixed to the seat frame 5, such that the detecting link 3 can pivot in relation to the seat frame 5.

[0020] As shown in FIG. 4, the detecting rod 17, disposed underneath the detecting link 3, has a plurality of fixing holes 23. The detecting plate 19 is integrally mounted with an insertion pipe 25 for allowing the detecting rod 17 to be inserted therein. The insertion pipe 25 has a location determining hole 27 and a welding nut 29. The welding nut 29 is fastened by a fixing bolt 31 for fixing the location of the detecting plate 19 in relation to the detecting rod 17. The fixing bolt 31 is unscrewed for adjusting the location of the detecting plate 19, and the location thereof can be secured by screwing the fixing bolt 31.

[0021] The stopper means 50 includes a linear guide 33 fixed to the seat frame 5. The linear guide 33 guides linear movement in relation to the vertical plane shifting range of the detecting link 3. A slider 35 is guided by the linear guide 33. A sliding

surface of the slider 35 is in contact with the detecting link 3 in relation to a shifting direction of the detecting link 3, which pivots by being pushed by the back of an occupant. The slider 35 also prevents the detecting link 3 from shifting to a direction opposite to the above movement. A slider spring 37 (FIG. 5) resiliently supports the slider 35 for restricting a one-direction shift of the detecting link 3. A releasing cable 39 (FIGS. 1 and 2) couples, at one end, to the slider 35 such that the slider 35 is urged in the direction opposite to that which the slider spring 37 resiliently supports.

**[0022]** The slider 35 interacts with one headrest supporting pipe 11 (FIG. 5) of the detecting link 3 so as to allow the detecting link 3 to shift in only one direction. The slider 35, which makes contact with the headrest supporting pipe 11, has a sliding surface 41 in the frontal view while the rear view thereof has a flat surface vertical to the shifting plane of the headrest supporting pipe 11. This configuration allows the detecting link 3 to shift only when the headrest supporting pipe 11 contacts with the sliding surface 41 of the slider 35. Once the headrest supporting pipe 11 is shifted to contact with the flat surface of the slider 35, the headrest supporting pipe 11 is restrained from shifting.

**[0023]** With reference to FIG. 3, the pivot arm 15, shown underneath the hinge that pivotally supports the detecting link 3, is initially tilted forward via the return spring 7. Thus, the detecting plate 19 is also initially tilted in a forward position with the headrest 1 in an upright position (hereinafter referred to as "initial state"). The rear part of the headrest supporting pipe 11 faces the sliding surface 41 of the slider 35 in the initial state, as shown in FIGS. 5 and 8. When a rear impact occurs, an occupant's torso is pushed backward by the force of inertia, such that the occupant's back pushes against the detecting plate 19, causing the detecting link 3 to start shifting. Once the detecting plate 19 forces the detecting link 3 to shift, the headrest supporting pipe 11 pushes the

sliding surface 41 of the slider 35. Next, the slider 35 slides down by overcoming the elastic force of the sliding spring 37, thereby allowing the detecting link 3 to shift position.

**[0024]** According to FIGS. 8 and 9, the detecting link 3 is integrally linked to the headrest and fixed to the seat frame 5 via the hinged pivot arm 15. This arrangement allows the headrest to shift in an upward and forward position in response to the shifting of the detecting link 3. Thereby, the headrest effectively supports the head of the occupant during a rearward occurring vehicle collision.

**[0025]** During a typical rearward collision an occupant's body is pushed backward, as described above, and then thrust forward again from the seat. When the occupant's back is thrust forward and away from the detecting plate 19, the detecting link 3 returns to the initial state via the return spring 7. However, the front part of the headrest supporting pipe 11 makes contact with the vertical surface of the rear part of the slider 35, which prevents the detecting link 3 from returning to its initial state. Thus, the tilted headrest constantly supports the occupant's head, thus minimizing whiplash injury to the neck of the occupant. After a vehicle accident has occurred, the release cable 39 may be manually pulled to return the detecting link to its initial state and thus facilitating maintenance of the vehicle without having to disassemble the seat. The releasing cable 39 may alternatively be placed at one end towards the rear of the seat as shown in FIG. 2, or in another location.